

Feasibility Study – Medway Dam Package Water Treatment Plant

COUNCIL NAME

Wingecarribee Shire
Council

WEB ADDRESS

www.wsc.nsw.gov.au

SIZE

2,690 square kilometres

POPULATION

51,000

Overview of the project

Climate change may impact water supplies in the future due to increased demand during extreme heat or bushfire events, or interrupted supply due to drought or poor raw water quality.

This study investigated the feasibility of implementing a contingency potable water supply from Medway Dam using a package treatment plant located at the Medway water treatment plant (WTP) site, to increase Council's water supply resilience to climate change impacts. The study considered:

- availability of package treatments plant (lead time to install)
- on-site and ancillary requirements (eg power & controls)
- water treatment process and treatment capacity
- package plant scalability and transportability
- considerations for connecting into existing water distribution network
- suitability for use at other sites

The study identified capital and operating cost estimates and an implementation plan to install a package plant within a short timeframe (ie emergency conditions).

Background

Council currently supplies water to customers via two water treatment plants at Wingecarribee Dam and Bundanoon Dam. A third water source is available at Medway Dam; however, the Medway WTP has been offline for several years due to performance and safety issues, and high operational cost.

Council's Integrated Water Cycle Management Strategy (IWCMS) identified that the two operational WTPs may not be able to maintain water supply during high demand periods or water quality incidents caused by future climate change events. The IWCMS recommended Council investigate the feasibility of installing a package treatment plant at Medway WTP to supplement supply during an emergency. The recent 2019/20 bushfire event highlighted this risk as Bundanoon WTP was shut down due to imminent fire threat.

An example of a 10.5 ML/d package water plant installation in Broken Hill is shown below.



How the project was carried out

Wingecarribee Council engaged a consultant to prepare a feasibility study to confirm options for package treatment plants as well as other ancillary works required at the Medway Dam and Medway WTP sites.

Options in the feasibility study considered:

- Water quality management in the dam by implementing a destratification system
- Recommissioning or renewal of raw water pumping station and raw water pipeline
- Package water treatment plant options
- Recommissioning or renewal of existing Medway WTP assets or structures if suitable for use with a new package plant

The consultant engaged with suppliers to investigate a range of package plant capacities (2-8 ML/d), with purchase and rental options.

A condition assessment was carried out for existing facilities (raw water pumping station and pipeline and water treatment plant) to determine if assets require renewal or replacement. The condition assessment was based on a site visit and desktop assessment. Detailed condition assessment (eg pipeline destructive testing) was not carried out at this time.

Outcomes now and in the future

The proposed package plants will produce water of a quality that meets Australian drinking water standards, generally involving the following processes:

- pre-oxidation with chlorine and media filtration for iron and manganese removal
- coagulation and filtration (microfiltration or ultrafiltration) for algae and turbidity removal
- ultra violet light and/or chlorine disinfection

Other add on processes may be beneficial depending on the quality of the raw water

- pre-treatment using dissolved air flotation if required during periods of high solids or algae
- granular activated carbon or powdered activated carbon if required for taste and odour removal

The estimated purchase price for new package units (including supply, delivery, installation and commissioning) range from \$1.7 M (2 ML/d) to \$4.9 M (8 ML/d). The estimated total project costs for the Medway WTP site including ancillary works range from \$3.4 M (2 ML/d) to \$9.0 M (8 ML/d). The ancillary works at Medway WTP include:

- Civil works - hardstand area, vehicle access, raw water and treated water pipework, and drainage (waste pumped to existing sludge lagoons)
- Electrical works - power upgrade for larger units (existing power may be sufficient for a 2 ML/d unit), telemetry
- Existing clear water storage and chlorine gas dosing system – confirmation of asset condition, renewals/repairs as needed, and cleaning of clear water tank
- Existing sludge lagoons to store and dewater the filter backwash waste
- A new pumping station to deliver water to the existing distribution system

For the rental option (assuming a 12-month rental arrangement), estimated costs for supply, delivery and commissioning of the package units range from \$96,000 (2 ML/d) to \$302,000 (8 ML/d). These costs exclude operating costs and ancillary works costs.

Additional operating costs estimates for the package units (if operated by suppliers) range from \$42,000 (2 ML/d) to \$155,000 (8 ML/d) per month.

The lead time for delivery/installation of the package units is 4-8 weeks subject to availability.

Package plant units are modular, giving the ability to augment capacity through installation of additional units, provided ancillary civil and electrical works are appropriately sized.

The package plant units can be readily relocated to another site. However, the chlorination and waste handling processes identified for this project (which utilise existing infrastructure), as well as ancillary works (civil and electrical supply) are site specific and would need to be designed and installed for each new location. Package chlorination systems can be provided by suppliers if required.

Other infrastructure identified to complete the installation at the Medway Dam/WTP sites include:

- bubble plume aeration in Medway Dam for raw water quality control

- replace existing raw water pump units and controls/power supply.
- renew/reline existing raw water pipeline if need is confirmed by further condition assessment.

The outcomes of the study are:

- The costs identified for the package plant and ancillary works at Medway WTP site appear to be prohibitive, and will need to be assessed against other resilience options at the existing Wingecarribee and Bundanoon WTPs
- Council will revisit strategic water supply options as part of the next update of the IWCMS, which will inform the decision on the future of the Medway WTP and water supply source.

Benefits and lessons learned

Lessons learned from the study include:

- Some suppliers were unwilling to provide detailed information of capability and costs without further information on how Council would undertake the project. It was recommended to consider a range of procurement options with suppliers should the project proceed further. For example, an Early Contractor Involvement (ECI) process may allow development of a concept design.
- Suppliers generally do not provide proprietary rental arrangements, ie the rental fleet is only allocated on a first comes-first served basis.

Further tasks required for implementation of a new package plant supply at Medway include:

- Establish an ongoing monitoring program of raw water quality in Medway Dam to confirm water quality risks including pathogens, iron, manganese, algae, turbidity and taste/odour/toxins related to cyanobacteria.
- Review and update the Medway catchment water source risk assessment
- Prepare Drinking Water Management System (DWMS) documentation
- Project approvals including approval from DPIE under the Section 60 process, and environmental approvals.
- Further investigations into the condition of the existing raw water pipeline, including physical inspection and destructive/non-destructive testing.

To reduce the lead time and approval risks for implementing a package plant supply at Medway WTP, a concept design would need to be developed and the above investigations completed.



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